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## EUROPEAN PATENT APPLICATION

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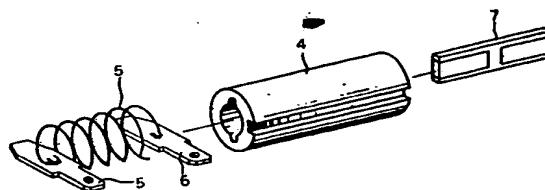
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### ④ Heat-sensitive safety resistor.

⑤ The present invention relates to a thermally-sensitive safety resistor comprising a heat-sensitive switch (7) formed by an insulating piece (1) provided with two bimetallic strips (3), a ceramic bushing (4) into which the heat-sensitive switch is inserted, and a resistance coil (5) wrapping around the bushing. The on-and-off of the switch (7) can be actuated by the heat produced by the resistance coil (5) when a current passes therethrough, thereby affecting on the switch to make or break the circuit.



**EP 0 062 082 A1**

HEAT-SENSITIVE SAFETY RESISTOR

The present invention is concerned with a heat sensitive safety resistor which is formed by providing each of the two sides of a silicon insulating piece with a heat-sensitive bimetallic strip which can only contact with each other by the silver contact at the free end thereof, and inserting the resulting assembly into a ceramic bushing which contains composition of good heat conductor such as aluminum, magnesium or zirconium and which is externally provided with two inserters interconnected with each other through a resistance coil wrapping around the bushing. The ceramic bushing and resistance coil are externally enamelled, or overlaid with non-combustible material. In so doing, when the current in the circuit reaches a predetermined value, the heat thereby produced would render the connection or the disconnection of the bimetallic strips. Thus it can be used to determine the value of current, or to indicate if the circuit is overloaded.

Conventional ammeters suffer several disadvantages. They are relatively complicated in structure, thus rendering the liability of trouble, making its maintenance difficult, and entailing high cost of production. Moreover, the parts thereof tend to be damaged by undue use in operation, such as erroneous wiring and so forth. Also, its relatively large size results in its inconvenience in use. For these reasons, they are not adapted to domestic use, in determining a specific value of electricity for a certain circuit. Thus the user cannot be alarmed when the circuit is electrically overloaded.

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Accordingly it is the object of this invention to provide a heat-sensitive safety resistor having simple layout and small size to be adapted to domestic use.

35 It's another object of this invention to provide a safety

resistor which can give out an alarming signal when the circuit is overloaded.

These objects of this invention will be accompanied by 5 embodiments as referred to in relation with the annexed drawing of this invention as following.

Fig. 1. is a fragmentary view of this invention;

Fig. 2 is a side view of the insulating piece with bimetallic strips;

Fig. 3 is a wiring diagram of an embodiment according to this invention;

Fig. 4 is a circuit diagram of a parallel circuit of a multi-sectional alarming device according to this invention;

15 Fig. 5 is a circuit diagram of a series circuit of a multi-sectional alarming device according to this invention;

Fig. 6 is a graphical representation of the multiple-contact heat-sensitive switch according to this invention.

20 With reference now to the drawing, particularly Fig. 2 thereof, this invention comprises a silicon insulating piece (1) on which there are mounted two bimetallic strip (3) respectively positioned on the two opposite flat sides thereof, which two bimetallic strips can only contact with 25 each other by a silver contact (2) disposed thereon, which constructs the heat-sensitive switch (7), thereby controlling the making-up or breaking of the circuit through the adjustment of adjusting screw (3') and the thermal expansion of the bimetallic strip to result in the on or off 30 of the switch when the temperature rises to a critical degree.

The circuit can be electrically connected to an alarming signal device, say a bulb, the lightness of which may vary 35 with the power consumption so that the bulb gives out a stronger light when the power consumption is high.

Referring to Fig. 1, this invention is formed by inserting the heat-sensitive switch (7) described hereinbefore into a ceramic bushing (4) containing composition of good heat conductors such as aluminum, magnesium, or zirconium. Also, 5 each of the two ends of resistance coil (5) is respectively connected to an inserter (6). The ceramic bushing is externally glazed with a layer of enamel or non-combustible material. When an excess electricity passes through resistance coil (5), the resulting heat can be transferred 10 through the ceramic bushing to affect on the heat-sensitive switch, to open or close the circuit.

Referring now to Fig. 3, there is shown a wiring diagram of the general switch of a domestic power supply system. When switch (8) is switched on, if the full load of the circuit 15 is approached so that the melting of the fuse is impending, the heat produced by the resistance coil (5) is just enough to switch on the heat-sensitive switch in series connection therewith to sound buzzer (9). Meanwhile bulb (10) gives out an alarming signal to remind the user of the safety of 20 using electricity. The measurement of the approximate current passing through a certain circuit can be carried out by varying the resistance coil or heat-sensitive switches (7). Besides, this invention can also be applied to electrical mosquito smudge or electric hair curler to 25 avoid the risk of overheating by way of short circuit.

A plurality of resistors according to this invention can be connected in series or in parallel, to achieve multiple-sectional alarming effect. As shown in Fig. 4, a 0.2 ohm 30 resistor which actuates the switch at  $100^{\circ}\text{C}$ , a 0.3 ohm resistor which actuates the switch at  $75^{\circ}\text{C}$ , and a 0.5 ohm resistor, at  $50^{\circ}\text{C}$ , are connected in parallel, to the resistance coil. The heat-sensitive switches are respectively connected to loop circuits having bulbs of different color. 35 With the increasing of the electric current, different bulbs of different hues are stepwise lit, thereby achieving the effect of multiple sectional alarming. Alternatively, the

example suggested in Fig. 5, in which the resistors are connected in series, can accomplish similar effect as well.

Further, the heat-sensitive switch can be designed as shown 5 in Fig. 6, wherein the diverse silver contacts are spaced apart by gaps of different width, to render the different electrical path to be built up at different temperature, so as to achieve multiple sectional alarming effect.

## CLAIM :

A heat-sensitive safety resistor, comprising a ceramic bushing (4);  
an insulating piece (1), provided with two bimetallic strips (3) to form a heat-sensitive switch to be inserted into said 5 bushing; said two bimetallic strips being mounted on said insulating piece in a manner so that they can be brought into electrical connection or electrical disconnection with each other thermally;  
a resistance coil (5) wrapping around said bushing;  
10 said ceramic bushing, heat-sensitive switch (7), and resistance coil being disposed so that the heat generated by the electric current passing through said resistance coil can affect on said heat-sensitive switch (7), and thus make or break the circuit of said heat-sensitive switch when the 15 electrical load of said resistor reaches a predetermined value.

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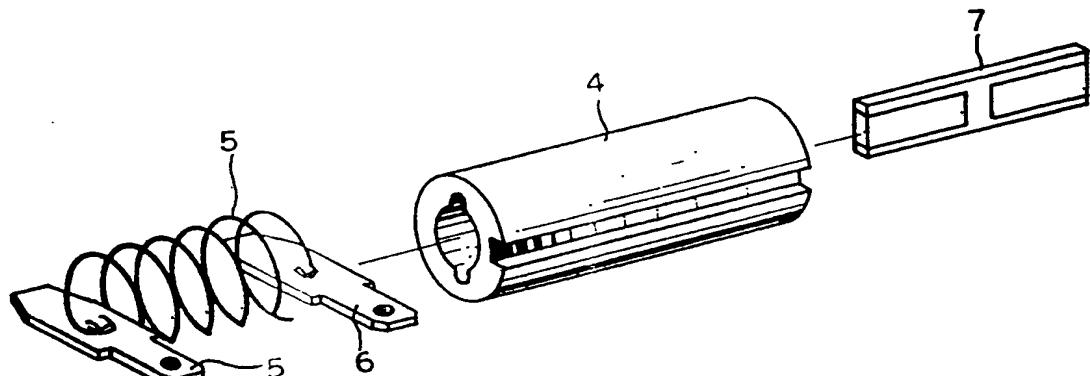


FIG. 1

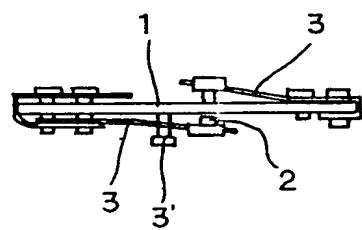
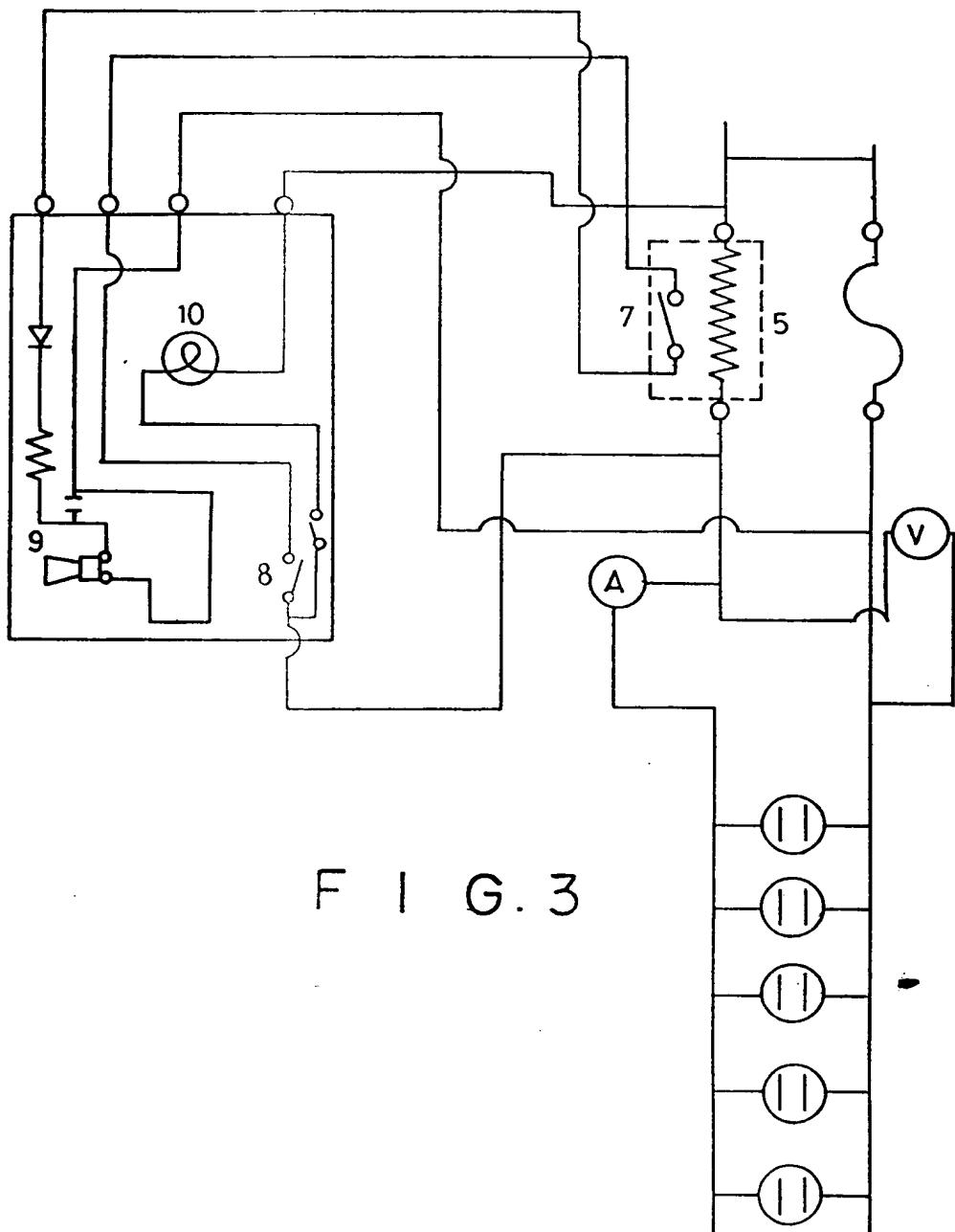


FIG. 2



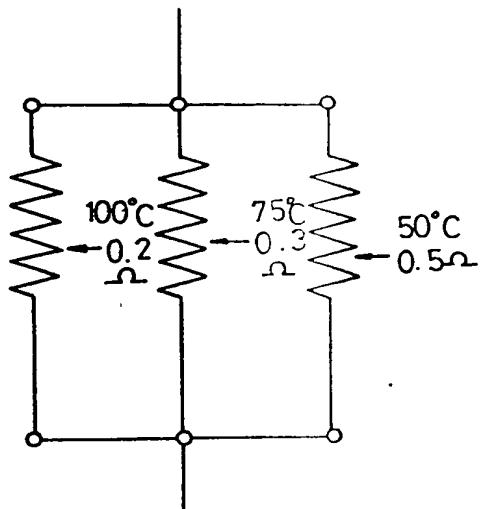


FIG. 4

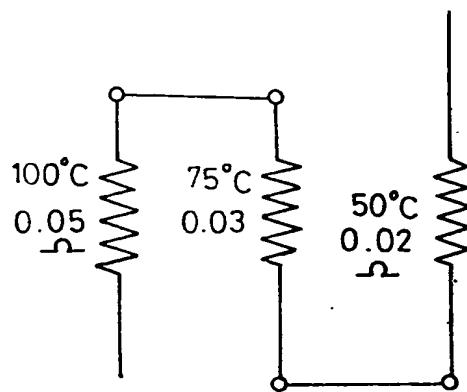


FIG. 5

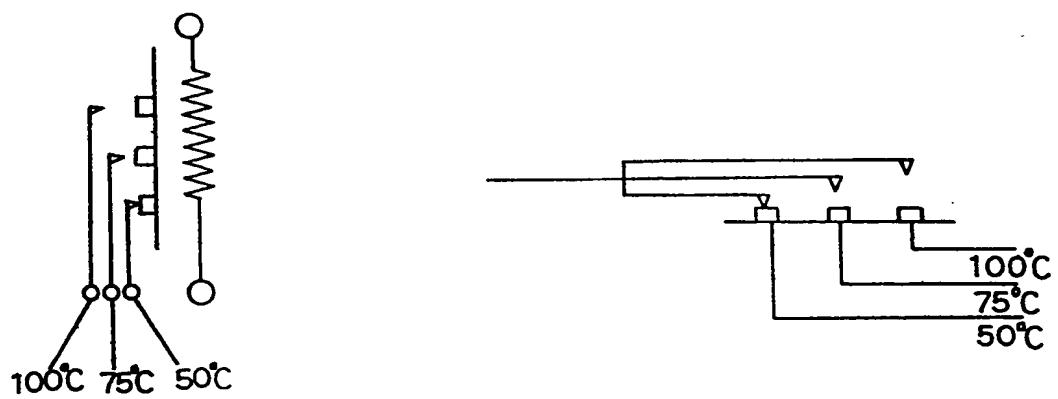


FIG 6



European Patent  
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## EUROPEAN SEARCH REPORT

0062082  
Application Number  
EP 81 10 2544

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	<u>US - A - 2 248 531 (G.C. HARRIS)</u>  * page 1, left-hand column, lines 16-26 *  --	1	H 01 H 61/02 71/16
	<u>US - A - 2 748 222 (R.W. DE LANCEY)</u>  * column 1, lines 56 to 72; column 2, lines 1 to 24 *  --	1	
	<u>GB - A - 502 712 (CRABTREE)</u>  * page 1, lines 84 to 104 *  --	1	
A	<u>FR - A - 1 073 667 (J. LECLABART)</u>  * page 3, left-hand column, first paragraph *  --	1	H 01 H 71/16 61/013 61/02 81/02 77/04
A	<u>DE - A - 2 030 077 (WAGNER)</u>  * page 2, paragraph 3 *  & <u>GB - A - 1 253 950</u>  -----	1	
			<b>CATEGORY OF CITED DOCUMENTS</b>
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
			E: member of the same patent family, corresponding document
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
The Hague	10-12-1981	LIBBERECHT	

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The present search report has been drawn up for all claims

**Place of search**

## The Hague

**Date of completion of the search**

**Examiner**

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